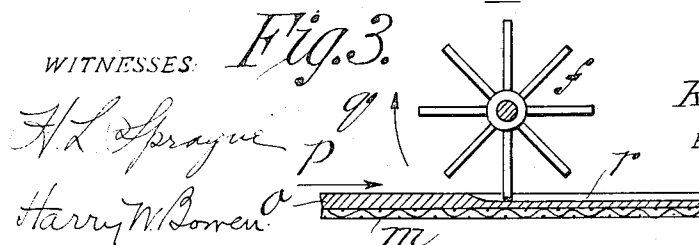
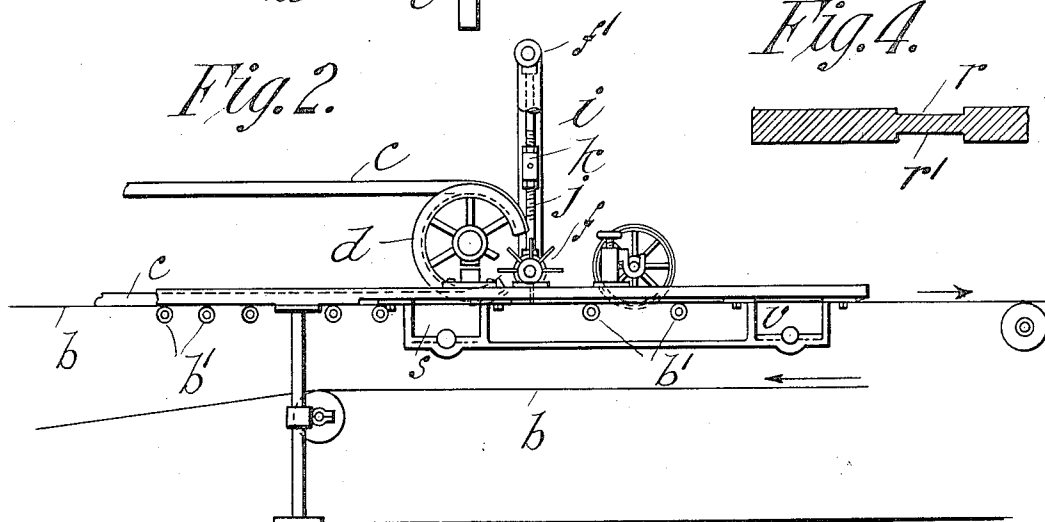
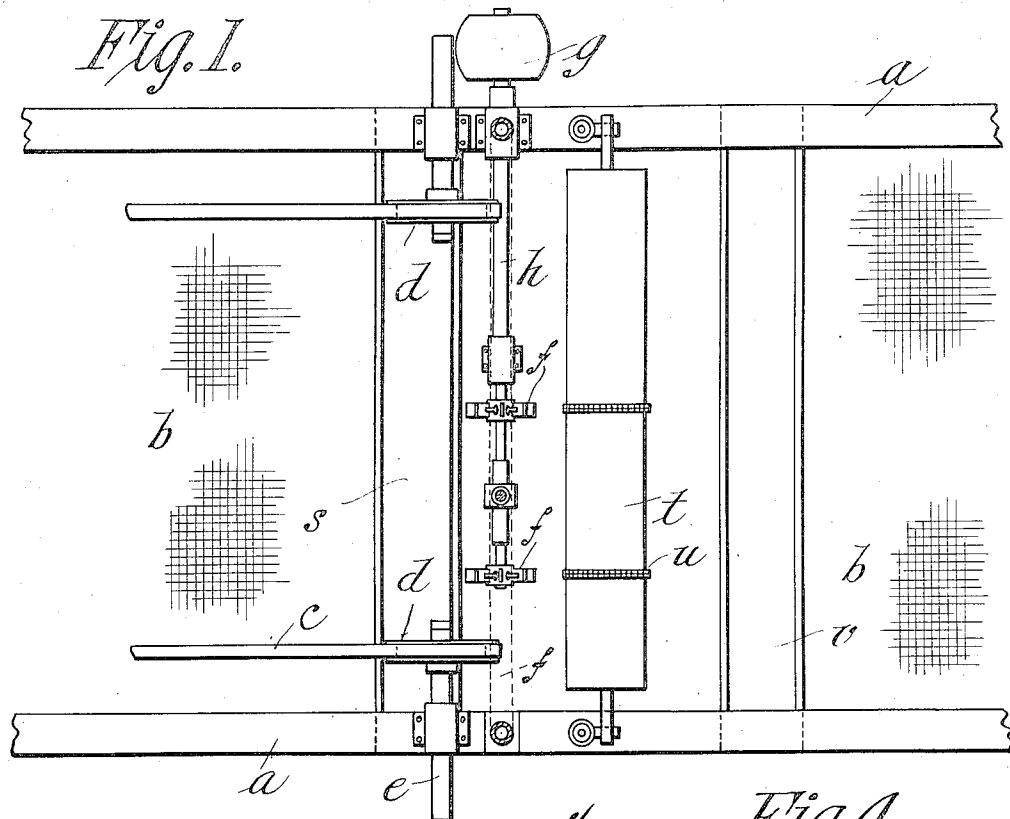


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PAPER MAKING MACHINE.
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1,032,107.

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PAPER-MAKING MACHINE.

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To all whom it may concern:

Be it known that I, RICHARD G. BENEDICT, a citizen of the United States of America, residing at Holyoke, in the county of Hampden and State of Massachusetts, have invented new and useful Improvements in Paper-Making Machines, of which the following is a specification.

The present invention relates to improvements in paper making machines in which the pulpy mass is carried through the machine on the ordinary Fourdrinier wire.

The object of the invention is to produce sheets of paper with a portion thereof thinner than the body or rest of the sheet.

It is found desirable, in blank book making, especially of the loose leaf binder type of books, to have a portion of the paper near the binding edge thinner than the rest of the sheet, so that this part of the sheet will readily fold or bend in opening and closing the book, and also in the ordinary use of the book. By making the sheets thinner, the bound edge of the book is kept the same thickness as the rest of the book.

A further object of the invention is to provide a mechanism which will leave the thinner portion of the paper with a finished surface so that writing or printed matter may be placed on both sides of this part of the sheet.

Prior to my invention, machines for thinning sheets of paper have been produced in which the thickness of the paper is effected by grinding or abrading the surface of the paper to remove a portion of the material. This process is generally carried out after the sheet has become thoroughly dry; other processes reduce the thickness of the paper by exerting a pressure on the pulpy mass during the passage of the wet pulp through the machine on the Fourdrinier wire, and still others effect practically the same result, by means of suction boxes, to extract the water from the pulp before it passes through the drying rolls. These suction boxes are sometimes located above the pulp on the wire to remove some of the stock.

My invention, in general, consists in placing above the pulpy mass on the Fourdrinier wire, and while the pulp is still in a wet state, rapidly revolving paddles that

lightly strike or engage the pulp and produce a channel in the unfinished paper, thus removing and throwing backward from the blades of the paddle wheel small quantities of pulp, thereby reducing the quantity of the paper stock at this point in its manufacture. This paddle wheel construction is preferably located adjacent the rear ends of the deckle-straps and in front of the dandy-roll. At this portion, the Fourdrinier wire of the machine has practically no vibration, and the channel that is formed by the paddle wheel will have regular or smooth sides. After the pulpy mass leaves the rapidly rotating paddle wheel it passes under a woven wire or fabric band which is located on the dandy roll, which serves the purpose of producing a uniform and even surface adjacent the grooved or thinned portion of the pulp or unfinished paper.

My invention therefore relates to improvements in paper making machines for producing a thin portion when the paper is in a wet state.

In the drawings forming part of this application,—Figure 1 is a plan view of so much of the paper making machine which relates to my improvement, and showing the paddle wheels located adjacent the rear end of the deckle straps and in front of the dandy roll. Fig. 2 is a side elevation of Fig. 1 showing the means of supporting the rotating paddle wheels with relation to the suction boxes, dandy roll, and the deckle straps. Fig. 3 is an enlarged end view of one of the paddle wheels and a portion of the pulp on the Fourdrinier wire showing the grooves made by the paddle wheels during the operation of the machine. Fig. 4 is a detail view of the finished sheet with the depth of groove uniform from side to side.

Referring to the drawings in detail, *a* indicates the framework of the machine which carries the ordinary Fourdrinier wire, indicated at *b*, supported on tube rolls *b'*. Located above the Fourdrinier wire, and at opposite edges thereof, are the usual deckle straps *c* supported on wheels *d*. The shafts which support the wheels *d* are preferably made short, as shown at *e*, in order that during the opera-

tion of the paddle wheels, shown at *f*, the pulp will be thrown backward onto the Fourdrinier wire without striking this shaft, which would be the case if it extended entirely across. These paddle wheels are rapidly driven by means of a suitable motor, as shown at *g*,—preferably an electric motor.

The free end of the shaft *h* on which the paddle-wheels *f* are mounted is suspended from any suitable bracket *f*¹ or support above the Fourdrinier wire. This suspension device comprises two rods *i* and *j* provided with right and left-hand threads, and a turn buckle *k* engaging the threads, whereby the free end of the shaft *h* may be raised and lowered to effect an accurately horizontal position of the shaft, and also to determine the depth of the groove in the pulpy mass.

Referring to Fig. 3, in which the Fourdrinier wire is shown at *m*, and the soft pulpy mass at *o*: *p* indicates the direction in which the wire is traveling, and *q* the direction in which the paddle-wheel *f* is rotated. It will be seen from this figure that during the rotation of the paddle-wheels, the ends of the blades will cut or scoop out the grooves in the pulp *w*, as shown at *r*, and the removed material will be thrown backward onto the advancing pulpy mass on the wire.

s indicates a suction box that is located near the wheels *d* for the purpose of removing a portion of the water in the pulp. This suction box therefore serves the purpose of bringing the pulpy mass down to a thinner or slightly more solid condition before it is acted upon by the paddle-wheels *f*; otherwise the pulp would not remain in a grooved condition. After the pulp is acted upon by the paddle wheels it passes under the dandy-roll *t* in the usual manner, but in order that the edges of the groove made by the paddle-wheels *f* may not be left in a ragged or irregular shape, I place on this roll bands of wire fabric *u*, (preferably a little narrower than the width of the paddle-wheels *f*) so that the wet pulp is squeezed or pressed into a uniform appearance by means of these bands, and yet at the same time leaving the wet paper material in a thin condition. After leaving the dandy roll *t*, the paper stock or material is again acted upon by a second suction-box *v* and more moisture is extracted. Beyond this point the construction of the machine is the same as in the ordinary paper making machine.

By means of a turn buckle *k* it is possible to adjust the shaft *h* so that one side of the groove *r* may be formed of less depth than the other, while Fig. 4 indicates that the groove is of uniform depth from one side to another. The wet paper pulp, after it

leaves the suction box *v*, passes under the usual press rolls which are generally covered with cloth. The effect of these rolls is to squeeze the pulp or paper stock at this grooved portion so that the sheet of paper in its finished state is thinned on the opposite side, as shown in Fig. 4 at *r*¹. That is to say, the press-rolls serve to equally distribute the stock about and on opposite sides to produce a sheet that is equally or nearly grooved to the same depth on both sides, as shown in this figure. This is advantageous as it makes the sheet uniform as to bending in opposite directions. The bands *u* being slightly narrower than the paddles *f* impart a clean sharp edge to the groove, thus making it of uniform depth from side to side.

It will be seen from this construction that I have produced a device for thinning sheets of paper while in a wet condition, or in process of manufacture, and one that may be economically and rapidly carried out without involving expensive changes and improvements in the ordinary paper making machines.

What I claim, is:—

1. In a machine for making sheets of paper with a thin portion having, in combination with the Fourdrinier wire and a dandy roll, a device to remove a portion of the pulp from the wire during the passage of the paper pulp material through the machine, and means on the dandy-roll for engaging the paper stock at the portions which have been acted upon by said device.

2. In a paper making machine, the combination with the Fourdrinier wire, deckle-straps and dandy-roll, of a paddle-wheel construction located forward of the dandy-roll and so placed as to scoop out a groove in the paper stock during its passage through the machine, and means on the dandy roll for compressing the edges of the groove.

3. In a paper making machine, the combination with the Fourdrinier wire, of means for removing a portion of the stock when in a wet condition, and means for adjusting the removing means so as to vary the depth and shape of the groove produced, and means for engaging the edges of the groove after it leaves the stock-removing means.

4. In a paper making machine, the combination with the Fourdrinier wire and suction boxes for removing some of the moisture in the paper stock, of a rotary device located above the Fourdrinier wire for producing a groove or channel in the paper stock during its passage through the machine, means for adjusting the rotary device to vary the depth of the groove, and a device located on the dandy roll in the rear of the rotary device for engaging and com-

pressing the grooved portion of the paper material, whereby a substantially uniform surface is obtained.

5. In a paper making machine, the combination with the Fourdrinier wire, suction boxes and dandy-roll, of a device to produce a groove in the paper-pulp and located back of one suction box and before

the dandy roll, and a fabric device on the roll to engage the grooved portion of the 10 paper pulp.

RICHARD G. BENEDICT.

Witnesses:

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HARRY W. BOWEN.
